UNIVERSITY OF CALIFORNIA PUBLICATIONS

COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
BERKELEY, CALIFORNIA

PRELIMINARY VOLUME TABLES

FOR

SECOND-GROWTH REDWOOD

BY

DONALD BRUCE

BULLETIN No. 334

OCTOBER, 1921

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY
1921

DAVID P. BARROWS, President of the University.

EXPERIMENT STATION STAFF

HEADS OF DIVISIONS

THOMAS FORSYTH HUNT, Dean.
EDWARD J. WICKSON, Horticulture (Emeritus).
——— ———, Director of Resident Instruction.
C. M. HARING, Veterinary Science, Director of Agricultural Experiment Station.
B. H. CROCHERON, Director of Agricultural Extension.
HUBERT E. VAN NORMAN, Dairy Management.
JAMES T. BARRETT, Plant Pathology, Acting Dircetor of Citrus Expeirment Station
WILLIAM A. SETCHELL, Botany.
MYER E. JAFFA, Nutrition.
RALPH E. SMITH, Plant Pathology.
JOHN W. GILMORE, Agronomy.
CHARLES F. SHAW, Soil Technology.
JOHN W. GREGG, Landscape Gardening and Floriculture.
FREDERIC T. BIOLETTI, Viticulture and Fruit Products.
WARREN T. CLARKE, Agricultural Extension.
ERNEST B. BABCOCK, Genetics.
GORDON H. TRUE, Animal Husbandry.
WALTER MULFORD, Forestry.
FRITZ W. WOLL, Animal Nutrition.
W. P. KELLEY, Agricultural Chemistry.
H. J. QUAYLE, Entomology.
ELWOOD MEAD, Rural Institutions.
H. S. REED, Plant Physiology.
L. D. BATCHELOR, Orchard Management.
J. C. WHITTEN, Pomology.
†FRANK ADAMS, Irrigation Investigations.
C. L. ROADHOUSE, Dairy Industry.
R. L. ADAMS, Farm Management.
W. B. HERMS, Entomology and Parasitology.
F. L. GRIFFIN, Agricultural Education.
JOHN E. DOUGHERTY, Poultry Husbandry.
D. R. HOAGLAND, Plant Nutrition.
G. H. HART, Veterinary Science.
L. J. FLETCHER, Agricultural Engineering.
EDWIN C. VOORHIES, Assistant to the Dean.

DIVISION OF FORESTRY

WALTER MULFORD
DONALD BRUCE
WOODBRIDGE METCALF
EMANUEL FRITZ

† In coöperation with Office of Public Roads and Rural Engineering, U. S. Department of Agriculture.

PRELIMINARY VOLUME TABLES FOR SECOND GROWTH REDWOOD

By DONALD BRUCE

The importance of second-growth stands of redwood (*Sequoia sempervirens*) is just coming to be widely recognized. The only volume table applicable thereto, which as yet has been published, is that in "The Redwood,"* printed in 1903, and this is of the type, now obsolete, which disregards tree heights and treats all trees of a given diameter as if they had the same volume. The need of new tables is therefore evident. The preparation of those herewith presented was made possible by the U. S. Forest Service in making available for recompilation the tree measurements which were the basis of the earlier table above mentioned.

Many timber cruisers believe that virgin redwood cannot be measured accurately by means of volume tables, but the same arguments, such as those depending on its irregularity of form, extreme liability to breakage, etc., do not apply to young trees. The volume table method should be as applicable to second growth of redwood as to that of any other species.

Since the commercial importance of young redwood stands is still in the future the tables have been prepared on the basis of the close utilization which may be expected in coming years. It is anticipated that tops will be used down to 5 inches, and that stumps be cut as low as 18 inches.

Neither of the log rules commonly used in California, the Spaulding and the Scribner Decimal C, are accurate when applied to small trees, and the more scientific and correct, though little known, International rule, was therefore used. The volumes given in the tables should be considered as representing the amount of lumber which can actually be sawed by careful mill-practice, rather than the logscale by any commonly used rule.

The tables should be considered as preliminary approximations only, subject to subsequent revision. This is for two reasons, first, because the trees measured did not include a sufficient number of the larger sizes, and second, because the data were not secured from a sufficiently wide range of site conditions.

Two tables are presented. The first, based on merchantable height to 5 inches in the top, was prepared by the frustum form factor method. The second, based on total height, was derived from the first by means of a study of the average length of top above 5 inches for trees of various heights and diameters.

* Bulletin No. 38, Bureau of Forestry, U. S. Dept. of Agriculture.

Volume Table I

Diam. Breast High Inches	Merchantable Height Number of 16-Foot Logs to 5 Inches in Top											Basis No. of Trees	Frustum Form Factor*	Average Height Logs
	1⅛	1½	2	2½	3	3½	4	4½	5	5½	6			
					VOLUME		BOARD FEET							
7	18	25	34	44	54	66								
8	19	27	39	51	64	78						257	.99	1.4
9	20	30	43	58	74	90							.98	
10	20	32	48	65	84	103						160	.97	1.9
11	21	34	52	73	94	115	137						.95	
12	22	37	58	81	105	130	154					113	.93	2.4
13	23	40	63	89	117	145	172	202	225				.92	
14			68	97	130	159	190	222	252			54	.90	2.9
15			74	105	143	174	209	242	280				.89	
16			81	112	156	191	230	269	309			30	.88	3.1
17			87	123	170	210	252	295	339				.87	
18			93	135	183	225	277	321	371			11	.86	3.4
19					198	250	303	353	406	455	509		.85	
20					216	271	330	385	442	495	555	13	.85	3.7
21					235	295	357	413	479	535	602		.84	
22					254	320	386	451	518	580	650	1	.84	3.7
23					274	343	416	485	557	625	699		.83	
24					294	368	447	520	596	670	751	2	.83	3.9
25					314	396	479	560	640	720	805		.82	
26					336	421	512	597	686	771	861	1	.82	4.0
27					358	452	546	639	733	825	919		.82	
28					381	480	581	679	781	875	978	1	.81	4.2
29					405	507	618	720	830	930	1041		.81	
30					430	545	656	768	880	992	1107		.81	
Total..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	643		

* The ratio between the volume of the actual tree and that of a theoretical tree of perfectly regular taper, a value calculated and used in preparing the table.

Stump height 1.5 feet.

Trees scaled in 16 foot logs with 0.3 foot trimming allowance to 5 inches d. i. b. in top, International rule.

Basis 643 stem analyses taken by U. S. Forest Service in 1899 in Humboldt and Del Norte Counties.

Check against basic data shows aggregate error of 9/100 of 1 per cent, and average deviation of individual trees of 13.7 per cent.

Volume Table II

Diameter Breast High Inches	Total Height—Feet									
	40	50	60	70	80	90	100	110	120	130
			VOLUME BOARD FEET							
8		20	32	44	58					
9		26	38	52	69					
10	18	30	45	63	82	103				
11	24	38	54	75	97	121				
12	30	46	65	88	113	138	163			
13	35	54	77	104	131	158	184	210		
14	41	63	90	119	149	178	208	238		
15	45	72	104	136	169	200	232	264		
16	49	82	118	154	190	226	262	298	334	370
17		92	132	173	213	254	295	335	376	416
18			147	193	237	282	329	373	419	485
19			163	213	263	313	364	414	464	515
20			182	237	293	348	403	458	513	568
21			203	263	323	384	446	506	566	626
22			225	291	357	423	489	555	621	687
23			253	323	393	463	533	603	673	743
24			274	351	428	505	582	659	736	813
25				379	463	547	631	715	799	883
26				408	500	592	684	776	868	960
27				443	542	641	740	839	938	1037
28				477	584	691	798	905	1012	1119
29				514	630	746	862	978	1094	1210
30				559	682	805	928	1051	1175	1298

Stump height 1.5 feet.

Trees scaled in 16 foot logs with 0.3 foot trimming allowance to 5 inches d. i. b. in top by International Rule.

Basis: Table I, converted by study of length of top above 5 inches for various diameters and lengths.

STATION PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION

BULLETINS

No.

185. Report of Progress in Cereal Investigations.
241. Vine Pruning in California, Part I.
246. Vine Pruning in California, Part II.
251. Utilization of the Nitrogen and Organic Matter in Septic and Imhoff Tank Sludges.
253. Irrigation and Soil Conditions in the Sierra Nevada Foothills, California.
261. Melaxuma of the Walnut, "Juglans regia."
262. Citrus Diseases of Florida and Cuba Compared with Those of California.
263. Size Grades for Ripe Olives.
266. A Spotting of Citrus Fruits Due to the Action of Oil Liberated from the Rind.
267. Experiments with Stocks for Citrus.
268. Growing and Grafting Olive Seedlings.
270. A Comparison of Annual Cropping, Biennial Cropping, and Green Manures on the Yield of Wheat.
271. Feeding Dairy Calves in California.
273. Preliminary Report on Kearney Vineyard Experimental Drain.
275. The Cultivation of Belladonna in California.
276. The Pomegranate.
278. Grain Sorghums.
279. Irrigation of Rice in California.
280. Irrigation of Alfalfa in the Sacramento Valley.
282. Trials with California Silage Crops for Dairy Cows.
283. The Olive Insects of California.
285. The Milk Goat in California.
286. Commercial Fertilizers.
290. The June Drop of Washington Navel Oranges.
294. Bean Culture in California.
297. The Almond in California.
298. Seedless Raisin Grapes.
299. The Use of Lumber on California Farms.
300. Commercial Fertilizers.
301. California State Dairy Cow Competition, 1916-1918.

No.

302. Control of Ground Squirrels by the Fumigation Method.
304. A Study on the Effects of Freezes on Citrus in California.
308. I. Fumigation with Liquid Hydrocyanic Acid. II. Physical and Chemical Properties of Liquid Hydrocyanic Acid.
309. I. The Carob in California. II. Nutritive Value of the Carob Bean.
310. Plum Pollination.
312. Mariout Barley.
313. Pruning Young Deciduous Fruit Trees.
316. The Kaki or Oriental Persimmon.
317. Selections of Stocks in Citrus Propagation.
318. The Effects of Alkali on Citrus Trees.
320. Control of the Coyote in California.
321. Commercial Production of Grape Syrup.
322. The Evaporation of Grapes.
323. Heavy vs. Light Grain Feeding for Dairy Cows.
324. Storage of Perishable Fruit at Freezing Temperatures.
325. Rice Irrigation Measurements and Experiments in Sacramento Valley, 1914-1919.
326. Brown Rot of Apricots.
328. Prune Growing in California.
329. A White Fir Volume Table.
330. Dehydration of Fruits.
331. Phylloxera-Resistant Stocks.
332. Walnut Culture in California.
333. Some Factors Affecting the Quality of Ripe Olives Sterilized at High Temperatures.
334. Preliminary Volume Tables for Second-Growth Redwoods.
335. Cocoanut Meal as a Feed for Dairy Cows and Other Livestock.
336. The Preparation of Nicotine Dust as an Insecticide.
337. Some Factors of Dehydrater Efficiency.

CIRCULARS

No.

70. Observations on the Status of Corn Growing in California.
76. Hot Room Callusing.
82. The Common Ground Squirrels of California.
87. Alfalfa.
110. Green Manuring in California.
111. The Use of Lime and Gypsum on California Soils.
113. Correspondence Courses in Agriculture.
114. Increasing the Duty of Water.
115. Grafting Vinifera Vineyards.
126. Spraying for the Grape Leaf Hopper.
127. House Fumigation.
128. Insecticide Formulas.
129. The Control of Citrus Insects.
130. Cabbage Growing in California.
135. Official Tests of Dairy Cows.
138. The Silo in California Agriculture.
139. The Generation of Hydrocyanic Acid Gas in Fumigation by Portable Machines.
144. Oidium or Powdery Mildew of the Vine.
148. "Lungworms."
151. Feeding and Management of Hogs.
152. Some Observations on the Bulk Handling of Grain in California.
153. Announcement of the California State Dairy Cow Competition, 1916-18.
154. Irrigation Practice in Growing Small Fruits in California.

No.

155. Bovine Tuberculosis.
157. Control of the Pear Scab.
158. Home and Farm Canning.
159. Agriculture in the Imperial Valley.
160. Lettuce Growing in California.
161. Potatoes in California.
164. Small Fruit Culture in California.
165. Fundamentals of Sugar Beet Culture under California Conditions.
166. The County Farm Bureau.
167. Feeding Stuffs of Minor Importance.
168. Spraying for the Control of Wild Morning-Glory within the Fog Belt.
169. The 1918 Grain Crop.
170. Fertilizing California Soils for the 1918 Crop.
172. Wheat Culture.
173. The Construction of the Wood-Hoop Silo.
174. Farm Drainage Methods.
175. Progress Report on the Marketing and Distribution of Milk.
176. Hog Cholera Prevention and the Serum Treatment.
177. Grain Sorghums.
178. The Packing of Apples in California.
179. Factors of Importance in Producing Milk of Low Bacterial Count.
181. Control of the California Ground Squirrel.
182. Extending the Area of Irrigated Wheat in California for 1918.

No.
183. Infectious Abortion in Cows.
184. A Flock of Sheep on the Farm.
185. Beekeeping for the Fruit-grower and Small Rancher or Amateur.
188. Lambing Sheds.
189. Winter Forage Crops.
190. Agriculture Clubs in California.
191. Pruning the Seedless Grapes.
193. A Study of Farm Labor in California.
198. Syrup from Sweet Sorghum.
201. Helpful Hints to Hog Raisers.
202. County Organizations for Rural Fire Control.
203. Peat as a Manure Substitute.
205. Blackleg.
206. Jack Cheese.
208. Summary of the Annual Reports of the Farm Advisors of California.
209. The Function of the Farm Bureau.
210. Suggestions to the Settler in California.

No.
214. Seed Treatment for the Prevention of Cereal Smuts.
215. Feeding Dairy Cows in California.
217. Methods for Marketing Vegetables in California.
218. Advanced Registry Testing of Dairy Cows.
219. The Present Status of Alkali.
220. Unfermented Fruit Juices.
221. How California is Helping People Own Farms and Rural Homes.
222. Fundamental Principles of Co-operation in Agriculture.
223. The Pear Thrips.
224. Control of the Brown Apricot Scale and the Italian Pear Scale on Deciduous Fruit Trees.
226. Protection of Vineyards from Phylloxera.
227. Plant Disease and Pest Control.
228. Vineyard Irrigation in Arid Climates.
229. Cordon Pruning.